



NUTRIENT RECYCLING FROM ORGANIC RESIDUE MATERIALS

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Organic residues such as slurry, manure, fermentation products, sewage sludge and biogenic production residues from the industry are generally a cost-effective and sustainable alternative to mineral fertilizers. They contain plant nutrients such as phosphorus, nitrogen and potassium as well as trace nutrients in different concentrations, but mostly water. Direct application is now severely restricted by law due to soil over-loading and partial contamination with pollutants, such as heavy metals, drug residues or microplastics. This is why in many places, especially in agriculture, major storage problems persist with regard to liquid manure and fermentation products from biogas plants. In addition, adjusting a fertilizer specifically for optimal effect on an individual crop is virtually impossible due to the often heterogenic composition of these substances. Under certain circumstances, this can lead to over-fertilization, undesirable input of substances such as nitrate into the groundwater or of climate-damaging nitrous oxide into the atmosphere.

The valuable components of these organic residual substances, i.e. nutrients and carbon, can and should nevertheless be used materially and energetically in the interest of sustainable regional economic cycles. To this end, the **abonocare**[®] project was started in 2019 with the aim of developing technologies for complete nutrient recycling. A main focus is the processing of phosphorus- and nitrogen-containing substances into fertilizer products. Additionally, various technologies for the separation, processing and handling of organic waste products will be developed. Nine partners from the industry and six research institutions take part in **abonocare**[®], an initiative scientifically coordinated by Fraunhofer IKTS and funded with 10 million euros from the German Federal Ministry of Education and Research (BMBF).

Services offered by Fraunhofer IKTS as part of the abonocare[®] project:

- Development of ceramic membranes for phosphorus equilibrium shift during hydrothermal carbonization
- Development of filters and processes for hot-gas filtration for the separation of heavy metals directly in sewage sludge incineration
- Development of ceramic membranes for the direct extraction of ammonium from process waters stemming from biogas production as well as from vapors stemming from drying and stripping
- Development and testing of PAA-free flocculants based on starch for solid/liquid separation
- Development of analysis methods along the entire process chain



1 Fractionated digestate and end products, such as fertilizer granulate, liquid fertilizer and litter pellets.